PATENT SPECIFICATION

758,755

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COMPLETE SPECIFICATION

"Improvements in Ship Logs".

I, SVERRE WOLDSETH, a Norwegian subject of Strandgaten 18, Bergen Norway, do hereby declare the invention for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to an improvement in ship logs, that is devices for measuring the speed of a ship through the water.

The object of the present invention is to provide a ships' log which is of inexpensive construction, yet gives a highly accurate reading and in which a generated signal may be transmitted to remote indicating dials, as for instance to dials in the chart house.

According to the invention there is provided a ships log of the kind comprising a housing having an inlet tube and an outlet tube so arranged as to cause water flow through said housing in accordance with the speed of the ship, a propellor rotatably mounted within said housing, a pulse generator for setting up an alternating current having a frequency corresponding to the speed of rotation and a measuring instrument to measure the frequency of said current, characterised in that the water driven propeller or the blades of said propeller are made of magnetic material, or said propeller carries magnetic pole shoes whereby the propeller, the propeller blades or the pole shoes respectively form part of the pulse generator.

Preferably the pulse generator comprises electromagnetic windings connected to the input of an electronic amplifier, the output of said amplifier being connected to the measuring instrument which is graded into the speed unit.

In order that the invention may be more clearly understood one particular embodiment thereof will now be described by way of example with reference to the accompanying drawings, wherein: —

Fig. 1 shows a diagrammatic vertical section through the housing of the log and the electromagnetic pulse generator.

Fig. 2 is a circuit diagram of the amplifier and the indicating part of the log;

Fig. 3 is a plan view of the pulse generator; and Figs. 4 and 5 are diagrams illustrating the operation of the electronic amplifier.

Referring to these drawings in a housing 1 is rotatably mounted a turbo rotor or propeller 2 with a plurality of vanes 3. The housing is provided with an inlet tube opening forwardly at the bottom of the ship and an outlet tube opening aft.

Each vane 3 carries on its outer end a shoe 4 of a magnetic, non-corrosive material, preferably stainless steel. During the rotary movement of the blades said pole shoes successively pass an extension 5 in the housing, separated from the water passage of the housing by a thin metal wall 6 of a non-magnetic material. In the extension 5 an electro-magnetic pulse generator 7 is arranged. This pulse generator may comprise windings coupled to the input of an amplifier 8, the output of which is coupled to a speed indicator instrument 9.

Due to the flow of water through the housing 1, the propeller 2 is driven at a speed corresponding to the speed of the ship. Each pole shoe 4 generates two pulses in the pulse generator 7 each time a pole shoes passes the pulse generator. The number and spacing of the pole shoes may be so arranged in relation to the poles of the pulse generator, that the frequency of the current generated is multiplied. The voltage induced in the pulse generator is used as input voltage in the amplifier 8. This amplifier delivers an output voltage independent of the amplitude value of the voltage generated. The outgoing current passes through one or a plurality of electrical measuring instruments 9. The reading of the instruments 9 may be adjusted to

a setting giving nautical miles per hour directly or in another desired manner.

The construction of the pulse generator and the amplifier will now be described. It should, however, be noted that the construction shown in the drawing is given only by way of example, and that the construction may be modified. in any manner readily apparent to those skilled in the arm.

A strong permanent magnet 10 e.g., Alnico has its magnetic axis mounted normal to the plane of rotation of the vanes, that is parallel to the propellor shaft and carries four cores 11 of cast iron, one in each corner, as shown in Fig. 3. Each core 11 carries a coil 12, the coils of all cores being coupled in series and connected to the input of the amplifier 8. It should be observed that the dimensions of the coil cores are small in the circumferential direction of the housing, compared with the dimensions in the axial direction. Because of the highly compressed rectangular section of the cores short but strong pulses are set up in the coils 12 at the passage of the pole shoes 4. As shown in the present example there are two sets of coils in the circumferential direction of the housing. The spacing between the cores in this direction is selected to equal one half of the distance between two neighbouring vanes, so that two pulses are set up for each passage of a pole shoe past the pulse generator. The repetition frequency of the voltage induced in the pulse generator is thus double the frequency of passage of poles past the pulse generator.

In the example shown in the drawing the electronic amplifier comprises two pentodes 13. The output from the last of said pentodes is connected to a bridge rectifier 14, wherefrom the rectified voltage is coupled to the indicator instrument 9.

In the diagrams shown in Figs. 4 and 5, the working of the amplifier unit is illustrated.

Fig. 4 shows the pulse train from the pickup which is the input to the first grid, and output voltage from the first valve.

Fig. 5 illustrates the anode current in the second valve plotted against the input voltage to the grid of the second valve.

The pulses from the pickup device having a form as shown in Fig. 4 are fed to the input terminals 17 of the amplifier. The input network comprises a lowpass filter generally indicated at 18 to avoid disturbances from high frequency devices on board, that is transmitters, navigation aids etc.

The pulse repetition frequency may be of the order 30-30 c/s corresponding to a speed 2-20 knots and the pulse length of the order 5 to 0.5 m.sec. (milli sec.).

The first valve 13*a* acts as a normal amplifier whilst the other valve 13*b* acts as limiter, having a limiting resistor 19 in series with the grid. The RC combination 20, 21 is chosen so as to give a time constant which is fairly large compared with the lowest pulse repetition frequency to be measured. The value of the grid limiting resistor 19 is chosen large compared with the grid imput resistance of the valve when drawing grid current. The anode current therefore will have a rectangular wave form as shown in Fig. 5, and the voltage appearing at the anode has a similar form with a constant amplitude independent of the frequency. A differentiating network, the time constant of which is short compared with the pulse length corresponding to the highest speed to be measured, comprising a capacitor 22 and a resistor 23 make an alternating current flow through the resistor. The mean absolute value of this current is proportional to the pulse repetition frequency. The current is rectified in the bridge rectifier 14, and made to flow through preferably a moving coil instrument which will show the speed on a linear scale. It should be noted that the rectifier unit may be omitted and the output of the amplifier directly coupled to the indicator. However, in such cases an AC instrument must be used, and such instruments have, as is well known in the art, a non-linear movement and therefore a less convenient scale.

A variable resistor 15 is coupled in parallel with the measuring instrument 9 for calibrating the instrument.

The amplifier unit is driven from the main power supply of the ship through a suitable filtering device.

In order to render the instrument reliable, the anode voltage supply is stabilised by means of a neon stabilising valve 24 and a suitable series resistor 16.

The resistor 16 may be made variable so as to accommodate different voltages of the source which may vary in different installations.

It should be noted that the invention may be modified in different ways within the scope of the invention, for example the blades or the entire propeller may consist of a suitable metal.

What I claim is:—

1. A ships log comprising a housing having an inlet tube and an outlet tube so arranged as to cause water flow through said housing in accordance with the speed of the ship, a propeller rotatably mounted within said housing, a pulse generator for setting up an alternating current having a frequency corresponding to the speed of rotation and a measuring instrument to measure the frequency of said current, characterised in that the water driven propeller or the blades of said propeller are made of magnetic material, or said propeller carries magnetic pole shoes whereby the propeller, the propeller blades or the pole shoes respectively form part of

the pulse generator.

2. A ships log according to Claim 1, wherein the pulse generator comprises electromagnetic windings connected to the input of an electronic amplifier, the output of said amplifier being connected to the measuring instrument which is graded in the speed unit.

3. A ships log according to Claim 2, wherein said electromagnetic windings comprise two coils wound on cores mounted in a plane normal to the plane of rotation of said propeller.

4. A ships log according to Claim 3, wherein the dimension of the coil cores in the rotational direction of the propeller is small compared with the dimension perpendicular to the plane of rotation of the propeller.

5. A ships log according to Claim 2, wherein the output of the electronic amplifier is coupled through a rectifier to the measuring instrument which is an instrument having a linear scale in the measuring field.

6. A ships log according to Claim 1 or 2, wherein a variable resistance is used to shunt the measuring instrument for calibration purposes.

7. A ships log for measuring the speed of a moving vessel, substantially as herein described with reference to the accompanying drawings.

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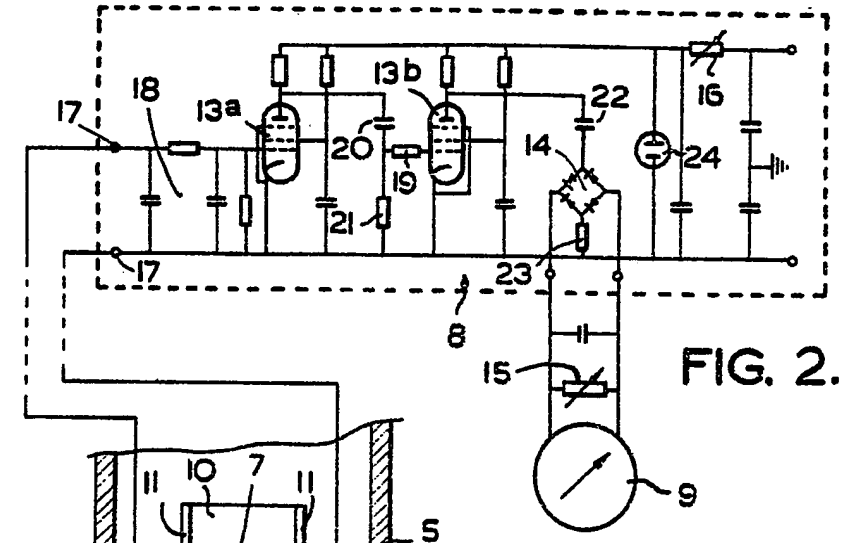

FIG. 2.

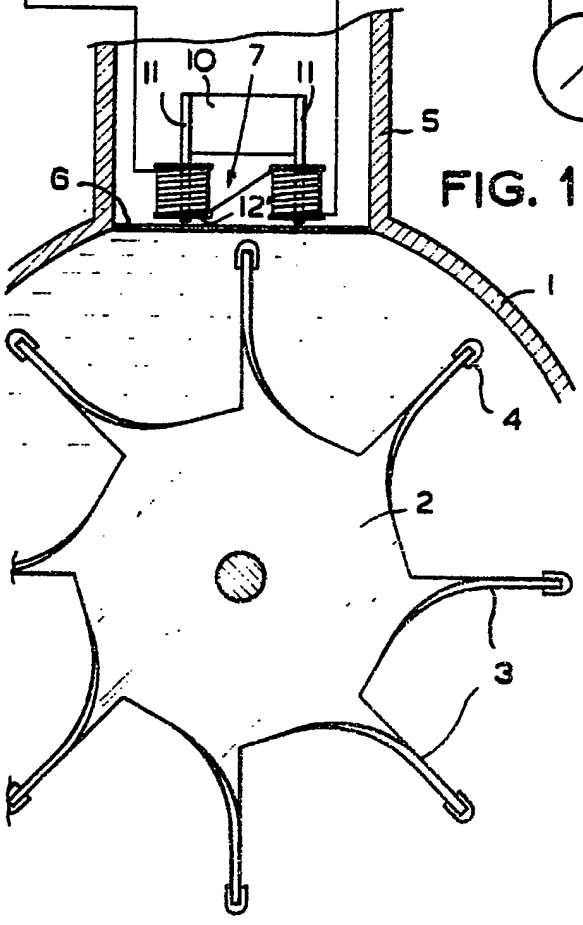

FIG. 1.

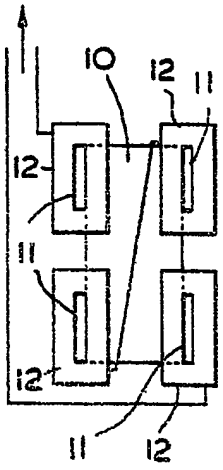

FIG. 3.

758,755 COMPLETE SPECIFICATION
2 SHEETS
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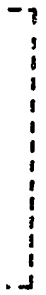
SHEETS 1 & 2



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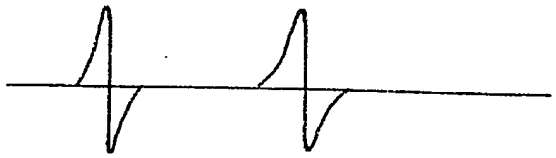
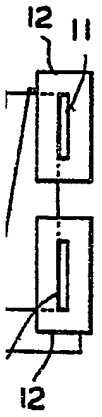


Fig.4.



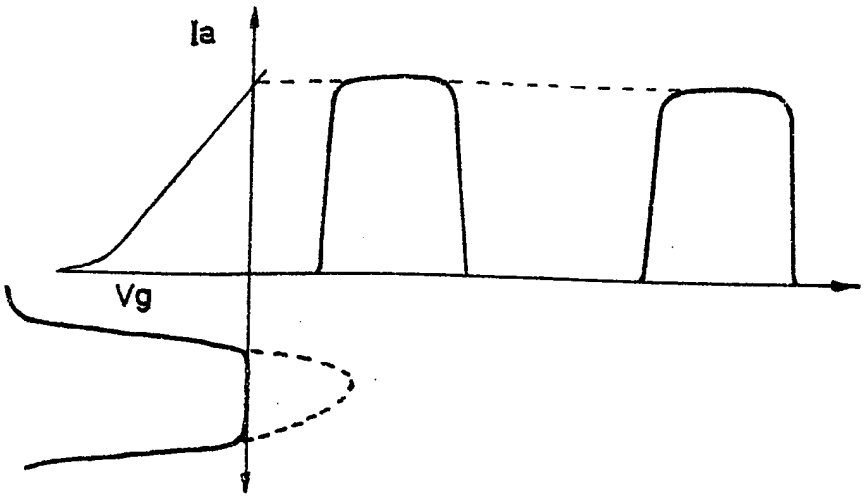


Fig. 5.

758,755 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

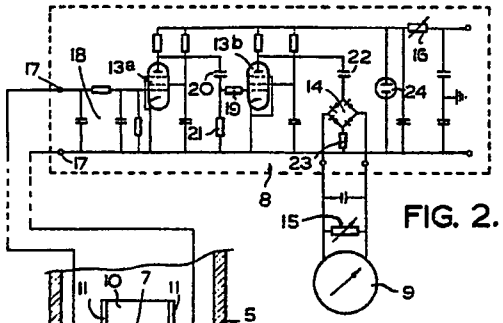
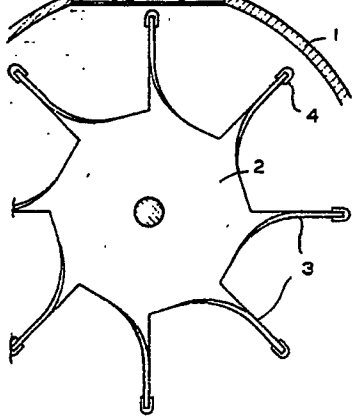


FIG. 2.

FIG. 1.



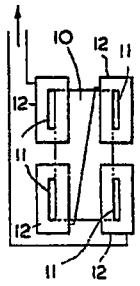


FIG. 3.

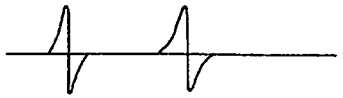


Fig.4.

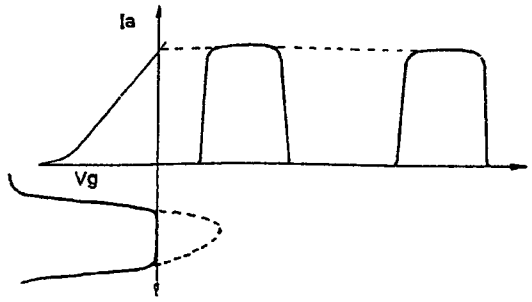


Fig. 5.